Eda, Kawai, McReynolds and Kurle, alone or in any combination, do not teach or suggest a method for hermetically packaging a bulk acoustic resonator device including the steps of providing a first wafer having a first surface and a second surface that face toward opposite directions, with a plurality of bulk acoustic resonator devices disposed on the first surface, the first wafer further having a plurality of cavities that are formed at positions corresponding to the bulk acoustic resonator devices and are open at the second surface; providing a second wafer having a plurality of wells; providing a third wafer; bonding the second wafer to the first surface of the first wafer and bonding the third wafer to the second surface of the first wafer to form a composite wafer in which the bulk acoustic resonator devices of the first wafer are aligned with the wells of the second wafer and sealed by the second wafer, and the cavities of the first wafer are sealed by the third wafer; forming holes in the composite wafer after formation of the composite wafer so that the holes reach metal tracks connected to the bulk acoustic resonator devices, and filling the holes with metal; and separating individual bulk acoustic resonator devices by sawing the composite wafer after the holes are filled with metal, as recited in claim 1. This applies by extension to claims 2, 4 and 9 based on their dependence from claim 1.

In addition, Eda, Kawai, McReynolds and Kurle, alone or in any combination, fail to teach or suggest a method for hermetically packaging a bulk acoustic resonator device including the steps of providing a first wafer having a first surface and a second surface that face toward opposite directions, with a plurality of bulk acoustic resonator devices disposed on the first surface; providing a second wafer having a plurality of wells; bonding the second wafer to the first surface of the first wafer to form a composite wafer in which the bulk acoustic resonator devices of the first wafer are aligned with the wells of the second wafer and sealed by the second wafer; forming holes in the composite wafer after formation of the composite wafer so that the holes reach metal tracks connected to the bulk acoustic resonator

devices, and filling the holes with metal; and separating individual bulk acoustic resonator devices by sawing the composite wafer after the holes are filled with metal, as recited in claim 15. This applies by extension to claims 16, 17 and 21 based on their dependence from claim 15.

Instead, Eda discloses integrated circuits with piezoelectric components. In particular, Eda teaches a quartz device including a quartz plate 21 overhanging from a holding member 24′ disposed between a cover substrate 25 and a bottom substrate 29 (example 37). An opening 28 is formed in the holding member 24′ to provide a recess to enable a runner electrode 23 to be deposited on the bottom substrate 29 (col. 42, lines 21-58 and Fig. 31D of Eda).

Further, Eda teaches a quartz plate 61 having rectangular projections and superposed by an excitation electrode 63 (example 41). The quartz plate 61 overhangs from a holding member bulk 62, which is then cut into separate holding members (col. 47, lines 23-48 and Fig. 35D of Eda). These teachings represent separate embodiments, and Eda fails to provide motivation to combine the opening of example 37 with the separate cuttings of example 41.

Also, Eda discloses a holding member 12 having pre-formed through holes 16a, 16b under a quartz plate 11 (example 36). The holes permit connection between terminals 15a, 15b and a runner electrode 17 (col. 41, line 32 – col. 42, line 9 and Fig. 30D of Eda). However, as acknowledged in the Final Office Action at page 5, Eda fails to disclose, teach or suggest forming holes in a composite wafer <u>after</u> formation of the composite wafer, and filling the holes with metal. Thus, Eda does not disclose, teach or suggest <u>separating</u> individual bulk acoustic resonator devices by sawing the composite wafer <u>after the holes are filled with metal</u>, as recited in claims 1 and 15.

The Response to Arguments, at page 10 in the Final Office Action, asserts that Eda teaches that the holes are formed prior to separation (Fig. 35B of Eda). Applicants respectfully

assert that this is not sufficient for a *prima facie* case of obviousness. Eda teaches (Figs. 35A – 35E) a manufacturing process in the following order: forming holes; filling the holes with metal; forming a composite wafer; and separating individual devices from the composite wafer. In particular, Eda teaches the holding member bulk 62 has through holes 66 filled with metal (col. 46, lines 52-57), and afterwards that the holding member bulk 62 and the quartz wafer 65 are bonded to each other (col. 47, lines 9-18) to form a composite wafer. Thus, the order of steps for Applicants' claimed method differ from the process order disclosed by Eda.

Further, Kawai discloses an angular velocity sensor 11 having a vibrator 14 suspended on a frame portion 12 between upper and lower substrates 3, 1. In particular, Kawai teaches a conductive film 22 on the internal wall surfaces of holes 21 in the upper substrate 3 to communicate with supports 17 of electrodes 17A (col. 6, lines 52-60; col. 7, lines 35-52; col. 9, line 44 – col. 10, line 14; and Figs. 1 and 11 of Kawai). However, the communicating hole 21 is formed in a structure that contains a single angular velocity detecting element 11 (col. 6, lines 44-65 and Fig. 1; also Figs. 2-21 of Kawai). Thus, Kawai does not disclose a composite wafer having more than one bulk acoustic resonator device and thereby fails to teach or suggest separating individual bulk acoustic resonator devices, and so Kawai cannot reasonably be considered to teach or suggest separating individual bulk acoustic resonator devices after the holes are filled with metal. Hence, Kawai does not compensate for the subject matter lacking in Eda.

Applicants further assert that Kawai teaches forming the communicating hole 21 after the upper substrate 3 and the silicon substrate 2 have been joined, and then forming the conductive film 22 in the hole 21 (col. 9, line 60 – col. 10, line 14 of Kawai). However, the combination of the upper substrate 3 and the silicon substrate 2 joined to each other produces only a single device. In contrast, the composite wafer recited in claims 1 and 15 includes a

plurality of devices that are to be subsequently separated. Thus, the substrate combination of Kawai differs from Applicants' claimed features.

In addition, Kawai fails to teach or suggest forming holes and filling the holes with metal after forming the composite wafer. Thus, Kawai does not suggest that the order of the steps taught in Eda can be changed to the order recited in claims 1 and 15. Therefore, one of ordinary skill in the art would not consider it obvious to apply Kawai to change the order of the steps in Eda to produce the order recited in Applicants' claims.

The order of the steps of forming a composite wafer, forming holes, and filling the holes with metal recited in claims 1 and 15 differs profoundly from the process taught in Eda. The teachings of Eda cannot be considered to be substantially equivalent in terms of function, manner and result, because if a composite wafer is formed before forming holes and filling them with metal, as provided in claims 1 and 15, then it is possible to establish a connection between the metal filling the holes and the metal tracks with higher reliability, as compared to Eda. However, neither this advantage nor the recited order of steps is taught or suggested by Eda, thereby rendering Applicants' claimed features to be non-obvious.

Also, McReynolds discloses a method for manufacturing a microfluidic device. In particular, McReynolds teaches a two-layer body structure 10 having a bottom portion 12 with channels 16 and a top portion 18 with through-holes 24 (col. 3, lines 50-60 and Fig. 1 of McReynolds). Because McReynolds is directed to a fluid manifold, rather than an acoustic resonator, an artisan of ordinary skill would not have been motivated at the time of the invention to apply McReynolds to address or discover Applicants' claimed features.

Moreover, Kurle discloses a method for producing wafer sensors. In particular, Kurle teaches sensor elements 2 disposed on a substrate wafer 1 that is bonded to a cap wafer 3 having wells 4 and contact holes 9 (col. 3, line 30 – col. 4, line 15 and Figs. 1A-1H of Kurle).

Further, there is no motivation to combine features related to the quartz device of Eda with the angular velocity sensor of Kawai, the microfluidic device of McReynolds and the bonded substrates of Kurle. The Final Office Action has not established a proper motivation for a *prima facie* case of obviousness. Even assuming that motivation to combine the applied references is established, the combination fails to teach or suggest Applicants' claimed features.

A *prima facie* case of obviousness for a §103 rejection requires satisfaction of three basic criteria: there must be some suggestion or motivation, either in the references or knowledge generally available to one skilled in the art to modify the references or combine reference teachings, the combination must provide a reasonable expectation of success, and the references must teach or suggest all the claim limitations (MPEP §706.02(j)). Applicants assert that the Final Office Action fails to satisfy these requirements with Eda, Kawai, McReynolds and Kurle.

For at least these reasons, Applicants respectfully assert that the independent claims are patentable over the applied references. The dependent claims are likewise patentable over the applied references for at least the reasons discussed, as well as for the additional features they recite. Consequently, all the claims are in condition for allowance. Thus, Applicants respectfully request that the rejections under 35 U.S.C. §103 be withdrawn.

In view of the foregoing, Applicants respectfully submit that this application is in condition for allowance. Favorable reconsideration and prompt allowance are earnestly solicited.

Should the Examiner believe that anything further is desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact Applicants' undersigned representative at the telephone number listed below.

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